**Design of Visualizations**

GitHub Link: <https://github.com/thealphacubicle/EV-Visualization/tree/main>  
  
**NOTE 1:** We prefer you test our website by cloning our GitHub repository instead of running the files submitted on Gradescope as the former is much easier and is structured accordingly. For further details on testing, please refer to the ‘README.md” file in our GitHub repository.

**NOTE 2:** Due to issues with our GitHub Pages deployment, Professor Yang has allowed us to submit only the repo link and files to Gradescope for the purpose of submission.

**Interactive Plot 1: Geographic Distribution of EV Registrations in Washington State (Map Chart)**

* Design Choice: Used a color-coded clustering approach on an interactive map to represent the concentration of electric vehicle registrations.
* Interactivity: Users can zoom in to view specific clusters; clicking a cluster breaks it down into smaller areas, eventually revealing individual markers for registered vehicles.
* Data Representation: Each circle's size and color intensity correspond to the number of registrations, providing an immediate visual cue of density. Summarized popups enrich the map with detailed information about each location.

**Details:**

* **Marks**: Circles (Cluster markers)
* **Channels**:
  + **Position**: Geographic coordinates of EV registrations
  + **Size**: Quantity of registrations
  + **Color**: Intensity reflects the concentration of registrations
* **Pop-out**: Size and color intensity used to emphasize areas with higher concentrations.
* **Interaction**: Zoom on click, with pop-up details on further clicks.
* **Facet**: Single map view without facets.

**Interactive Plot 2: Trend of Electric Vehicle Registrations by Type (Line Chart)**

* Design Choice: Chose a line graph with point markers to illustrate the registration trends over time, distinguishing between BEVs and PHEVs using color.
* Interactivity: Users can hover over points to see tooltips with detailed data and use a dropdown to filter by EV type.
* Data Representation: The time series nature of the data is best represented by a line chart, making it easy to track changes and trends in EV registrations over the years.

**Details:**

* **Marks**: Points connected by lines
* **Channels**:
  + **Position (Vertical)**: Number of registrations
  + **Position (Horizontal)**: Model year
  + **Color**: Unique colors for BEVs and PHEVs
* **Pop-out**: Line markers to highlight specific data points.
* **Interaction**: Hover tooltips and EV type filter dropdown.
* **Facet**: Single line chart without facets.

**Interactive Plot 3: Comparison of Electric Vehicle Types by Make (Vertical Bar Charts)**

* Design Choice: Implemented side-by-side bar charts to compare the number of BEVs and PHEVs by car make, using a logarithmic scale due to the wide range of values.
* Interactivity: A dropdown filter allows users to select specific EV types to display.
* Data Representation: The log scale ensures that all data points are visible and comparable, even when there are large disparities in the numbers.

**Details:**

* **Marks**: Bars (rectangular marks)
* **Channels**:
  + **Position (Vertical)**: Log-scaled number of vehicles
  + **Position (Horizontal)**: Car makes
  + **Color**: Unique colors for BEVs and PHEVs
* **Pop-out**: Log scale to equalize visual representation of all makes.
* **Interaction**: Dropdown filter for selecting EV types.
* **Facet**: Side-by-side vertical bars for BEV and PHEV comparison.

**Static Plot 1: Top Electric Utility Firms Used in WA (Horizontal Bar Chart)**

* Design Choice: Utilized a horizontal bar chart for a clear and straightforward comparison of the top utility firms based on the number of vehicles serviced.
* Data Representation: A descending order bar chart provides an instant hierarchy of utility firms, showcasing their relative market share.

**Details:**

* **Marks**: Bars (rectangular marks)
* **Channels**:
  + **Position (Horizontal)**: Number of vehicles serviced
  + **Position (Vertical)**: Utility firms in descending order
  + **Color**: Single color with varying shades for contrast
* **Pop-out**: Different shades of a single color to differentiate between utility firms.
* **Interaction**: No interaction (static)
* **Facet**: Single plot without facets.

**Static Plot 2: Price Versus Performance in 2019 (Bubble Chart)**

* Design Choice: Selected a bubble chart to compare EVs based on their MSRP against their electric range, where each bubble's size represents the vehicle count within that category.
* Data Representation: This visualization emphasizes the relationship between cost and performance, allowing users to spot trends and patterns in vehicle pricing and capability for 2019. The added legend helps interpret the bubble sizes in terms of vehicle counts.

**Details:**

* **Marks**: Circles (bubbles)
* **Channels**:
  + **Position (Vertical)**: Base MSRP
  + **Position (Horizontal)**: Electric Range
  + **Size**: Number of vehicles within a price and range category
  + **Color**: Color intensity based on the count of vehicles
* **Pop-out**: Bubble size and color depth to convey count importance.
* **Interaction**: No interaction (static)
* **Facet**: Single plot without facets, supplemented with a legend for count interpretation.